GALILEO NIMS AND SSI COLLABORATIVE OBSERVATIONS AT CALLISTO. M. Segura[1],K. Bender[2], J. Granahan[5,3] , T. McCord[3,5] , R. Greeley[2] , R. Carlson[1] , M. Belton[4] , and the NIMS and SSI Teams. [1] Jet Propulsion Laboratory, [2] Arizona State University, [3] SETS Technology Inc., [4] NOAO, [5] University of Hawaii.

On November 4, 1996 during the third of eleven orbits of the prime mission, the Galileo spacecraft passed over the surface of Callisto at an altitude of 1219 km - the first close encounter with this large Jovian moon. Prior to encounter, the Near Infrared Mapping Spectrometer (NIMS) and the Solid State Imaging teams coordinated joint observations which focused on the Asgard region of Callisto. The two instruments provide highly complementary data sets, with SSI imaging at high spectral resolution and NIMS collecting data at lower spatial resolution but with high spectral resolution and extended spectral coverage.

The Asgard multi-ring structure (figure 1) is a high priority target for both instruments. This 1640 kilometer diameter feature is the second largest ring structure on Callisto and is interpreted to have formed from a major impact event early in Callisto's history. The structure consists of a central high albedo plains surrounded by inward-facing, discontinuous scarps and troughs. In addition, several large impact craters occur in the area which post-date the Asgard structure. This preliminary coordinated effort of data comparison will focus on the large crater Tornarsuk and the Asgard structure itself.

The coordinated data set (table 1) includes a mosaic of images taken by the camera at a resolution of 1 km/pixel and 10 km/pixel. The spectrometer acquired 102 wavelength bands at 10 km/pixel resolution. The images comprising the SSI mosaic were taken through the clear filter. This provides high resolution context for the rest of the data set. This mosaic was used for selecting the albedo features focused on in this preliminary study. The camera multi-spectral filters used in the Asgard imaging include violet (0.415 microns), green (0.560 microns), continuum (0.757 microns), strong methane (0.888 microns) and 1 micron (0.989 microns). The spectrometer data (wavelength range of 0.7 to 5.2 microns) provides corresponding spatially resolved compositional information .

The actual merging of the SSI and NIMS data is a complex but systematic process. The raw NIMS data records are assembled, decoded, and labeled to create three dimensional arrays known as image cubes. These image cubes consist of spatial information in the x and y planes and spectral information in the z plane. Once the initial cubes are created, calibration and geometric corrections are applied. The initial SSI data is assembled in the form of uncalibrated, unprojected CCD images. The image data is then calibrated, updated with current navigation files, limb fits, and known geodetic control points. Prior to merging, photometric corrections are applied to both the NIMS and SSI data sets and a common resolution and projection is chosen. All previous steps in the process have been completed using either ISIS or VICAR but the actual assembly or stacking of the two data sets is accomplished in IDL. The data is then re-inserted into an ISIS file for analysis.

The merging of spectral maps with the high resolution images provides easy correlation of spectra with structural or albedo features. By combining the high resolution mosaic with the full suite of spectral data we hope to gain an understanding of the various surface albedo patterns and their geologic origin [see McCord et al, this issue].

Table 1. Table of observations used in this merged data set including the instrument observing and time of execution.

Observation Name	Instrument	Time	Resolution	Phase Angle	Filters/ Bands
C3CSCHEMCLR01	SSI	-17.5 hrs	10.1 km/pxl	54 degrees	5
C3CSASGRNG01	SSI	-4 hrs	1.1 km/pxl	53 degrees	1
C3CNASGARD01	NIMS	-1 hr	10 km/pxl	50 degrees	102

Figure 1. This figure shows the view of Callisto as seen by Galileo at 4 hours before C3 closest approach. The NIMS and SSI coverage of the Asgard region is indicated. Refer to table 1 for observation details. This figure is one of the products used in planning and may not reflect accurate or updated geometry.